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ABSTRACT

This paper introduces the contemporary research on information behaviors and applies it to educational research activities. Information behaviors are defined as the processes by which information users formulate their information needs, seek and observe sources, evaluate the sources, and then act upon the information. It is suggested that because education is an information transfer process, it is appropriate to transfer the information behaviors approach from the information and communications field to the education field. The particular approach discussed here is user-oriented, and the methodological techniques considered include Brenda Dervin's Sense-Making Approach, and more specifically, the Micro-Moment Time-Line Interview. These techniques are compared to traditional research methods, and it is argued that the traditional methods do not work as well as the user-oriented approaches because the assumptions that underlie traditional methods limit user responses. (31 references/10 additional readings) (Author/EW)

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An Introduction To Information Behaviors And Their Relationship To Educational Research

A Paper for the 1988
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Research Organization
Conference

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Abstract: This paper introduces the contemporary research on information behaviors and applies it to the educational research activities. Information behaviors are the processes by which information users formulate their information needs, seek and observe sources, evaluate the sources and then act upon the information. Since education is information transfer process the approach and methods employed, although they are generated from the information and communications field, are appropriately and effectively transferred into education. Further, this discussion is particularly relevant for educators as they develop integrated technologies into the teaching environment and must respond to pressures on the education establishment to prepare students for dealing with the notion of an information-driven environment.

The approach in this paper will focus on the user-oriented approach to the research on information behaviors. These research theories and methodologies have been recently developed in the communications and information field as a means of collecting information from the user's view of reality. An important feature of the user-oriented approach is that it challenges are assumptions about the way human being are as opposed to the way we want them to be. This approach is compared to the traditional research and data collection methods which view users from a set of assumptions that severely limit the range that the user can respond from.

Introduction

The time has come to turn our attention away from the hardware, the software, the databases and the networks and return our focus to the person at the keyboard. After all the attention focused on the role of information in this decade and the decades to follow, we still know little on how information and the individual get together and what happens when they do. This is a crucial question as educators determine what type of learning objectives related to information can be introduced into all levels of the learning experience.

This paper will introduce the contemporary research on information behaviors as it has been conducted in the information science and communications fields and applies it education. Education is, in many ways, an information transfer process, thus the approach and methods employed, although they are generated from the information and communications field, are appropriately and effectively transferred into education.

Information Behaviors

Information behaviors are the processes by which information users formulate their information needs, seek and observe sources, evaluate the sources and then act upon the information. These behaviors are not limited to the formal systems (such as a library, a book, or an authority) and includes the informal systems (such as friends, family, sensory, and self).

A framework for understanding what is meant by "information behaviors" is provided by Nilan and Dervin (1987), "Human beings move around in this reality and their primary survival duty is to get to know this reality and theory, move more efficiently (hence, information)...Human beings are definitely multi-step entities and the phenomena of interest to use should be their observational and movement capabilities, i.e. how they observe, interpret and cognitively move to maximize environmental conditions to their benefit..In order to develop behavioral models for the study of user behaviors, we must begin with assumptions that account for the way human being are rather than the way we wish them to be."

An individual is actively involved in the process of determining what information they need, how to find it, seeking it, gathering it, evaluating it, and reaching a point of resolve with what do to with it. The individual uses senses, self, family, friends, authorities, and formal sources (such as books) to solve the problems and curiousity needs that occur.

There is a movement in the design of educational delivery systems toward teaching knowledge and skills at the point of need rather than requiring students to store up knowledge in their heads for subsequent reuse over a lifetime (Daniels, 1986). For such a movement to be effective, we must examine what we know about information and what we know about how the user interacts with it.

It's what we don't understand about these processes that may be underlying some of our most fundamental problems in our delivery system. For example, a school system can develop a well-tooled media center program for its children and yet, when the children grow up, the majority of them will never or very rarely set foot in a library again. Is it because they don't think of the library when they have an information need? Is it because they don't want to seem foolish trying to explain their need to a librarian? Is it because they don't trust the library to have the information that they need so it is not worth the bother?

This is not just an education problem or library science's problem, it is really quite a classic problem. While Education concentrates on determining what should be known and how to deliver it. Information Science concerns itself with problems of proper system use and how to deliver it. Mass Communication deals with persuasion and influence at both the social and the individual level and how to deliver it. And Cognitive Psychology is examining why these delivery systems work the way they do. And in orbit around all these interests are individuals and their information behaviors.

What The User Studies Don't Tell Us

It would seem that we already have lots of information about the user. Countless "user-studies" and well over a thousand published papers are available on the topic of information needs and uses (Crawford 1978; Krikelas 1983). But what this block of research really provides us is studies on how the system is working, not on how the user is behaving. Only a small percentage of the available research addresses how people use and evaluate the many types and forms of information that flows around them as they make their way through life.

Many user studies give us data on how an information system is used, but this does not reveal why the user used a particular system, how they determined if the information was relevant or not, and how they expected the answer(s) to help them make sense out of their environment. This can be accounted for in the use of the traditional research approach and in the shortage of methods for gathering this information.

It is easy to become enamored with user-studies and look past methodological and instrument design flaws because the studies are perceived as "good" because they studied the "user". While "user-study" implies a real effort to understand the user the fact is that study was observing the system. "In user studies, the criteria are system criteria (e.g. keywords, system features, etc.) while in user-centric studies, the criteria are defined by the user and can change from situation to situation" (Nilan, Balakrishnan, Eisenberg, paper in progress).

Brittain (1982) expands on this by demonstrating user studies have concentrated upon the demands users make for documents, information, and library services. In fact, "very few have paid attention to what happens to documents once they reach users...the cognitive processes involved in reading, problem solving, and making use of data and information in the solution of problems and in the creation of new knowledge".

Another issue has been that the concept of "information need" does vary from the concept "information behavior". This is due, in part, to the fact that the sheer volume of research has not identified a standard conceptual basis, although there have been many calls in the literature for these devices. Ely (1973) challenged the profession to consider the myths of information needs, stating that "the lack of reliable protocols to measure information needs should offer a challenge to researchers."(p.17). Fifteen years of the most intensive developments in information processing technology have passed and still this challenge remains undefined. (Park, 1986). However recent work reveals important trends in information behavior analysis.

Where Do Information Behaviors Fit Into The Traditional Models in Education?

Most educators have at least some familiarity with information processing theories that are discussed in education. In order to clear up any confusion on this a brief clarification is in order. These Information processing theories do not treat the learning process as the element of primary focus but deal with "information" as it is the perceived processes of learning and mental knowledge representation. These investigations typically conclude processes by which the individual acquires and remembers information or suggests strategies implemented in problem solving focusing on tracking and describing sequences of mental operations and their products (i.e. information in the execution of particular cognitive tasks) (Anderson, 1980).

This theory differs from typical learning theory in that it is not characterized by the work of a single theorist or a particular research approach (Bell-Gredler, 1986); however, it is split between two types of theory within the cognitive realm. Posner & McLeod (1982) typify the laboratory-approach perspective in which theorists seek identification of the fundamental operations in mental activity. Whereas, other theorists (Neisser, 1976; Simon, 1979) advocate an approach for developing models that relate to real-world problems contending that the laboratory defined models lead to fragmented and contradictory data.

These system approaches utilize single-step observation methods, which characterizes methods used in the exact sciences (Nilan, 1987). A familiar example is Shannon & Weaver's (1960) mathematical model of communication. The system terms are objective and determined by the researcher, not the user. Single-step approaches maintain that the phenomena are passive, that they have no observational or movement capability of their own.

This research approach has not revealed the nature of the behaviors of learners. To better understand how an individual responds it must be approached from the user reality and not the systems perspective. Carter (1980, cited in Nilan) describes humans as "multi-step" entities that have both observational and movement capabilities that are essential to their continued existence and are therefore necessary foci for inquiry into their behavior. This approach allows us to look at humans as changing, developing, and complex creatures. Consequently research instruments developed in the context of the single step approach (particularly the laboratory approach) are inappropriate.

In order to demonstrate the differences, a brief comparative analysis of the traditional paradigms of methodological approaches and this "alternative" paradigm is provided so that the differences between the two approaches are understood. These traditional approaches are considered to be in the traditional paradigm of research in user or learner behaviors. The single most characteristic quality of the traditional paradigm is a foundation of assumptions regarding the behavior in questions. Or in other words, in creating the hypothesis the researchers automatically create an artificial reality of information or of knowledge.

Contemporary Research Approaches For Examining Information Behaviors

There have been many calls in the literature expressing the need for both user-oriented approaches in development of systems and for the development of a means for creating them. A recent chapter reviewing the literature since 1978

(Dervin, Nilan) in the Annual Review of Information Science and Technology cite a number of researchers (Stone, Wilson, White, Belkin, 1984; Belkin et al., 1983; Cronin; Dervin, 1977, 1983b; Maron; Mick et al; Zweizig) who call for more user-need oriented studies as a means of serving clientele better.

In two examples of the work in more user-need oriented studies done so far, (Belkin, Oddy & Brooks, 1982) developed the ASK (anomalous states of knowledge) hypothesis that an "information need arises from a recognized anomaly in the user's state of knowledge concerning some topic or situation and that, in general, the user in unable to specify precisely what is needed to resole that anomaly. In a 1984 study, Belkin expanded on this by viewing an effective information system as depending crucially upon the idea of 'problem management'. This idea is that humans, in the normal course of events, continually face problems with which they have to deal. Belkin believes that "all such problems call for strategies for their management or treatment".

These user-oriented approaches typically "posits information as something constructed by human beings. It views humans as beings who are constantly constructing, who are free (within system constraints) to create from systems and situations whatever they choose. By focusing on how people construct sense there is a search for universal dimensions of sense-making. (Dervin and Nilan, 1986). What is of particular interest to educators is understanding information use in particular situations and what leads up to and what follows intersections with system.

One contemporary educational theoretical approach that begins to embrace this perspective is Weiner's Attribution Theory. The basic assumptions of the theory relate to two general concepts. They are the nature of causal inferences (attributions) and the relationship of those inferences to behavior. It begins with a central assumption that the search for understanding is a basic "spring of action" (1979) and focuses on "attributions" which are defined individual's perceived causes of an event or an outcome. Or, put another way, according to Kelley (1973) it begins to focus on the ways in which people answer the question "Why". This approach is different from most traditional perspectives in that it views human beings from the perspective of their search to understand the world and to achieve personal fulfillment and self-actualization (Bell-Gredler, 1986).

Weiner has examined the ways in which individuals arrive at causal explanations and implications of those explanations. According to Weiner, the major difficulty with the one-dimensional analysis of attributions is that it does not

adequately account for subsequent effects. That is, several outcomes may result from attributions that occur in the same dimension, either internal or external (1972; Weiner et al., 1971). Although feelings are different than cognitive processes, Weiner assigns them a significant role in determining an individual's behavior and response to information. This assignment may be of particular significance to defining causal inferences to source evaluation.

A Theory and Methodology Of The User-Oriented Approach

Over the past 14 years Brenda Dervin and her colleagues have developed a set of premises and related methodologies called the "Sense-Making Approach". This approach "studies how people construct sense of their worlds and, in particular, how they construct information needs and uses for information in the process of sense-making. Since sense-making is central to all communicating situations (whether be intra-personal, interpersonal, mass, cross-cultural, societal, or internal) the Sense-making approach is seen as having wide applicability. (Dervin, 1983)

The Sense-Making approach has a set of core theoretic premises. They will briefly be discussed here and the reader is encouraged to use the accompanying List of Additional Readings for more information.

*Sense-Making begins with an assumption that reality is neither complete nor constant but rather filled with fundamental and pervasive discontinuities or gaps.

*Information is not a thing that exists independent of and external to human beings but is a product of human observing.

*It is assumed that all information producing is internally guided and since it is generally accepted that all human observing is constrained. Sense-Making further assumes that all information is subjective.

*Information seeking and use are posited as "constructing" activities--as personal creating of sense.

*Sense-Making focuses on how individuals use the observations of other as well as their own observations to construct their pictures of reality and use these pictures to guide behavior.

*It is assumed that sense-making behavior is responsive to and mandated by changing situational conditions.

> *Sense-Making assume that there is utility in starting with the person and finding systematic ways of having individuals share their observations about all manner of situations, including those they see as structurally constrained. (Dervin, 1983)

Perhaps the most developed methodological techniques for user-oriented approaches have been developed as a result of the Sense-Making Approach. Four techniques with variations have been developed and tested, the most prominent techniques is the Micro-Moment Time-Line Interview.

The Micro-Moment Time-Line Interview asks a respondent to detail what happened step-by-step in terms of what happened first, second, and so on. Then, for each step (called a Time-Line step), the respondent is asked what questions he or she had, what things he/she need to find out, learn, come to understand, unconfuse, or make sense of. These two elements form the core of the Time-Line. In-depth analyses are then (applied) to each questions ask as mandated by study purposes. (Dervin, 1985)

This interview technique has been applied in a wide variety of contexts ranging from cancer patients on chemotherapy treatments, college students on several issues, blood doors on most recent donations, and children on television watching. What is perhaps one of the most interesting features of this technique is that many of the participants enjoy the process and say they learn something from it.

> Statements by respondents on what they learned from participating in a sense-making study: (Dervin, 1983)
>
> *It helped me to analyze the situation and without anyone even telling me. I realized I was making a 'mountain out of a molehill.'
>
> *I never realized that I have so many unanswered questions in my mind when I am faced with a troublesome situation. I learned that it if I would sit down and think of what these questions are and try to answer them I will probably understand the problem better.
>
> *I got a whole perspective on the situation and learned that there were important elements I overlooked.
>
> *I felt like I was actually experiencing this situation all over again, only this time I had all the time in the world to think about and analyze what I was trying to accomplish.

Unfortunately an introductory paper such as this is too limited in space to provide the indepth understanding of the theories and issues necessary. A list of further readings accompanies this paper that will direct the reader to complete documentation.

Implications for Educators, Need for Future Development

Information can stimulate and aid the individual to organize, structure, interpret and analyze an individual view of the world. But there are barriers that stand between the information user and the needed resources that the education community has a key role in addressing. The first is overcoming the time-consuming and frustrating methods by which individuals have to go through to locate information. The second is teaching users how to manage their own information resources. As our understanding of information behaviors improves, we need to determine how the educational system respond to these needs.

It is hoped that the instruction will focus on helping the learner acquire knowledge of the structured array of information tools and the ways of acquiring, organizing, and managing a tailored subset for individual purposes. Students must acquire "library user skills" or "computer use skills" but rather information/computer literacy to solvetheir information problems and to cope with the demands placed on all who live in an information society. (Daniels, 1986)

For Perry (1981) an important goal of higher education lies in the individual's cognitive and ethical development. One means of promoting this growth may be to help the individual develop information seeking behaviors which encourage active growth. Lifelong learning (and lifelong development) may depend on the individual's skill in seeking information and interpreting and organizing it into personal knowledge. What we don't know yet is to what extent to which information seeking facilitates this learning and how we can translate this into learning situations. We may find that institutions of higher learning can find the means to enhance information seeking and evaluation rather than regarding it as a pattern which becomes habitual rather than questioned and learned.

Educators must be made aware that in information science users are typically viewed as a problem. User needs will nearly always fall short of being satisfied by information retrieved by the system. This is not a fault on the part of the user, but rather a failing of the system. In practice, however, the result is an attempt to have the user reconfigure his or her query rather than examine the system. What is our obligation to teach to the technology? Can we

develop enough evidence to make the technology yield to our learners?

Educational researchers should actively consider integration of the alternative approaches of information processing theories and the accompanying methodologies to educational research. The Timeline Interview method has immediate and important application in many aspects of education, but has immediate relevance to evaluation, instructional design, and counselling techniques.

There are many questions to be addressed. For example: "What are the information behaviors associated with learning? Are there patterns to the behavior individuals exhibit in these situations? Can we identify factors which facilitate or hinder information seeking behavior? Do our educational processes help, hinder, or have not effect on these actions?"

Do we all have to go out and get degrees in Information Science? No, of course not. But we do need to examine this "information society" in greater detail. The questions we need to address for future educational needs will not be answered simply be putting a computer on every child's desktop.

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